



## Complete Summary

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### TITLE

Iatrogenic pneumothorax (provider-level): rate per 1,000 discharges.

### SOURCE(S)

AHRQ quality indicators. Guide to patient safety indicators [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 76 p.(AHRQ Pub; no. 03-R203).

AHRQ quality indicators. Patient safety indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar 10. 107 p.

## Measure Domain

### PRIMARY MEASURE DOMAIN

Outcome

The validity of measures depends on how they are built. By examining the key building blocks of a measure, you can assess its validity for your purpose. For more information, visit the [Measure Validity](#) page.

### SECONDARY MEASURE DOMAIN

Does not apply to this measure

## Brief Abstract

### DESCRIPTION

This measure is used to assess the number of cases of iatrogenic pneumothorax per 1,000 discharges.

### RATIONALE

Hospitals in the United States provide the setting for some of life's most pivotal events - the birth of a child, major surgery, treatment for otherwise fatal illnesses. These hospitals house the most sophisticated medical technology in the world and provide state-of-the-art diagnostic and therapeutic services. But access to these services comes with certain costs. About 30% of personal health care expenditures in the United States go towards hospital care, and the rate of growth

in spending for hospital services has only recently leveled out after several years of increases following a half a decade of declining growth. Simultaneously, concerns about the quality of health care services have reached a crescendo with the Institute of Medicine's series of reports describing the problem of medical errors and the need for a complete restructuring of the health care system to improve the quality of care. Policymakers, employers, and consumers have made the quality of care in U.S. hospitals a top priority and have voiced the need to assess, monitor, track, and improve the quality of inpatient care.

Widespread consensus exists that health care organizations can reduce patient injuries by improving the environment for safety from implementing technical changes, such as electronic medical record systems, to improving staff awareness of patient safety risks. Clinical process interventions also have strong evidence for reducing the risk of adverse events related to a patient's exposure to hospital care. Patient Safety Indicators (PSIs), which are based on computerized hospital discharge abstracts from the AHRQ's Healthcare Cost and Utilization Project (HCUP), can be used to better prioritize and evaluate local and national initiatives. Analyses of these and similar inexpensive, readily available administrative data sets may provide a screen for potential medical errors and a method for monitoring trends over time.

The Iatrogenic Pneumothorax indicator is intended to flag cases of pneumothorax caused by medical care. This indicator is defined on both a provider level\* (by including all cases of iatrogenic pneumothorax occurring as a secondary diagnosis during hospitalization) and on an area level (by including all cases of iatrogenic pneumothorax) (see the related National Quality Measures Clearinghouse [NQMC] summary of the Agency for Healthcare Research and Quality [AHRQ] indicator [Iatrogenic pneumothorax \(area-level\): rate per 100,000 population](#)).

Iatrogenic pneumothorax excludes all trauma patients because these patients may be more susceptible to non-preventable iatrogenic pneumothorax or may be miscoded for traumatic pneumothorax.

\*The following concern affects the validity of this indicator:

- *Denominator unspecific:* The denominator for this indicator is less than ideal, because the true population at risk could not be identified using International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes. Some patients are likely included who are not truly at risk, or some patients who are at risk are not included.

Refer to the original measure documentation for further information.

## **PRIMARY CLINICAL COMPONENT**

Iatrogenic pneumothorax

## **DENOMINATOR DESCRIPTION**

All surgical and medical discharges, age 18 years and older, defined by specific Diagnosis-Related Groups (DRGs)

Exclude cases:

- With International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code of 512.1 in the principal diagnosis field or secondary diagnosis present on admission, if known
- Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, puerperium)
- With an ICD-9-CM diagnosis code of chest trauma or pleural effusion
- With an ICD-9-CM procedure code of diaphragmatic surgery repair
- With any code indicating thoracic surgery, lung or pleural biopsy, or assigned to cardiac surgery DRGs

**Note:** Refer to the Technical Specifications document for specific DRGs and ICD-9-CM codes.

## NUMERATOR DESCRIPTION

Discharges with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code of 512.1 in any secondary diagnosis field among cases meeting the inclusion and exclusion rules for the denominator

### Evidence Supporting the Measure

## EVIDENCE SUPPORTING THE CRITERION OF QUALITY

- A formal consensus procedure involving experts in relevant clinical, methodological, and organizational sciences
- One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

### Evidence Supporting Need for the Measure

## NEED FOR THE MEASURE

Variation in quality for the performance measured

## EVIDENCE SUPPORTING NEED FOR THE MEASURE

AHRQ quality indicators. Guide to patient safety indicators [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ)AHRQ Pub; 2007 Mar 12. 76 p.(AHRQ Pub; no. 03-R203).

### State of Use of the Measure

## STATE OF USE

Current routine use

## CURRENT USE

Internal quality improvement  
National reporting

Pay-for-performance  
Quality of care research

### Application of Measure in its Current Use

#### **CARE SETTING**

Hospitals

#### **PROFESSIONALS RESPONSIBLE FOR HEALTH CARE**

Physicians

#### **LOWEST LEVEL OF HEALTH CARE DELIVERY ADDRESSED**

Individual Clinicians

#### **TARGET POPULATION AGE**

Age greater than or equal to 18 years

#### **TARGET POPULATION GENDER**

Either male or female

#### **STRATIFICATION BY VULNERABLE POPULATIONS**

Unspecified

### Characteristics of the Primary Clinical Component

#### **INCIDENCE/PREVALENCE**

Unspecified

#### **ASSOCIATION WITH VULNERABLE POPULATIONS**

Unspecified

#### **BURDEN OF ILLNESS**

Unspecified

#### **UTILIZATION**

Unspecified

#### **COSTS**

Unspecified

## Institute of Medicine National Healthcare Quality Report Categories

### IOM CARE NEED

Getting Better

### IOM DOMAIN

Safety

## Data Collection for the Measure

### CASE FINDING

Users of care only

### DESCRIPTION OF CASE FINDING

All surgical and medical discharges, age 18 years and older, defined by specific Diagnosis-Related Groups (DRGs) (see the "Denominator Inclusions/Exclusions" field)

### DENOMINATOR SAMPLING FRAME

Patients associated with provider

### DENOMINATOR INCLUSIONS/EXCLUSIONS

#### Inclusions

All surgical and medical discharges, age 18 years and older, defined by specific Diagnosis-Related Groups (DRGs)

#### Exclusions

Exclude cases:

- With International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code of 512.1 in the principal diagnosis field or secondary diagnosis present on admission, if known
- Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, puerperium)
- With an ICD-9-CM diagnosis code of chest trauma or pleural effusion
- With an ICD-9-CM procedure code of diaphragmatic surgery repair
- With any code indicating thoracic surgery or lung or pleural biopsy or assigned to cardiac surgery DRGs

**Note:** Refer to the Technical Specifications document for DRGs and ICD-9-CM codes.

### RELATIONSHIP OF DENOMINATOR TO NUMERATOR

All cases in the denominator are equally eligible to appear in the numerator

#### **DENOMINATOR (INDEX) EVENT**

Clinical Condition  
Institutionalization  
Therapeutic Intervention

#### **DENOMINATOR TIME WINDOW**

Time window is a single point in time

#### **NUMERATOR INCLUSIONS/EXCLUSIONS**

##### **Inclusions**

Discharges with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code of 512.1 in any secondary diagnosis field among cases meeting the inclusion and exclusion rules for the denominator

##### **Exclusions**

Unspecified

#### **MEASURE RESULTS UNDER CONTROL OF HEALTH CARE PROFESSIONALS, ORGANIZATIONS AND/OR POLICYMAKERS**

The measure results are somewhat or substantially under the control of the health care professionals, organizations and/or policymakers to whom the measure applies.

#### **NUMERATOR TIME WINDOW**

Institutionalization

#### **DATA SOURCE**

Administrative data

#### **LEVEL OF DETERMINATION OF QUALITY**

Not Individual Case

#### **OUTCOME TYPE**

Adverse Outcome

#### **PRE-EXISTING INSTRUMENT USED**

Unspecified

## Computation of the Measure

### SCORING

Rate

### INTERPRETATION OF SCORE

Better quality is associated with a lower score

### ALLOWANCE FOR PATIENT FACTORS

Analysis by high-risk subgroup (stratification on vulnerable populations)  
Analysis by subgroup (stratification on patient factors, geographic factors, etc.)  
Risk adjustment method widely or commercially available

### DESCRIPTION OF ALLOWANCE FOR PATIENT FACTORS

Risk adjustment of the data is recommended using age, sex, modified Diagnosis-Related Group (DRG), and comorbidity categories.

Application of multivariate signal extraction (MSX) to smooth risk adjusted rates is also recommended.

### STANDARD OF COMPARISON

External comparison at a point in time  
External comparison of time trends  
Internal time comparison

## Evaluation of Measure Properties

### EXTENT OF MEASURE TESTING

The Patient Safety Indicators (PSIs) were evaluated by the project team using empirical analyses to explore the frequency and variation of the indicators, the potential bias, based on limited risk adjustment, and the relationship between indicators. The data sources used in the empirical analyses were the 1997 Florida State Inpatient Database (SID) for initial testing and development and the 1997 Healthcare Cost and Utilization Project (HCUP) State Inpatient Database for 19 States for the final empirical analyses.

All potential indicators were examined empirically by developing and conducting statistical tests for precision, bias, and relatedness of indicators. Three different estimates of hospital performance were calculated for each indicator:

1. The raw indicator rate was calculated using the number of adverse events in the numerator divided by the number of discharges in the population at risk by hospital.

2. The raw indicator was adjusted to account for differences among hospitals in age, gender, modified Diagnosis-Related Group (DRG), and comorbidities.
3. Multivariate signal extraction methods were applied to adjust for reliability by estimating the amount of "noise" (i.e., variation due to random error) relative to the amount of "signal" (i.e., systematic variation in hospital performance or reliability) for each indicator.

The project team constructed a set of statistical tests to examine the precision, bias, and relatedness of indicators for all accepted Provider-level Indicators, and precision and bias for all accepted Area-level Indicators. It should be noted that rates based on fewer than 30 cases in the numerator or the denominator are not reported.

The project team conducted a structured review of each indicator to evaluate the face validity (from a clinical perspective) of the indicators. The methodology for the structured review was adapted from the RAND/UCLA Appropriateness Method and consisted of an initial independent assessment of each indicator by clinician panelists using an initial questionnaire, a conference call among all panelists, followed by a final independent assessment by clinician panelists using the same questionnaire. The review sought to establish *consensual validity*, which "extends face validity from one expert to a panel of experts who examine and rate the appropriateness of each item..." The panel process served to refine definitions of some indicators, add new measures, and dismiss indicators with major concerns from further consideration.

Refer to the original measure documentation for additional details.

## **EVIDENCE FOR RELIABILITY/VALIDITY TESTING**

AHRQ quality indicators. Guide to patient safety indicators [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 76 p.(AHRQ Pub; no. 03-R203).

### **Identifying Information**

#### **ORIGINAL TITLE**

Iatrogenic pneumothorax (provider level definition) (PSI 6).

#### **MEASURE COLLECTION**

[Agency for Healthcare Research and Quality \(AHRQ\) Quality Indicators](#)

#### **MEASURE SET NAME**

[Agency for Healthcare Research and Quality \(AHRQ\) Patient Safety Indicators](#)

#### **DEVELOPER**

Agency for Healthcare Research and Quality



**FUNDING SOURCE(S)**

Agency for Healthcare Research and Quality (AHRQ)

**COMPOSITION OF THE GROUP THAT DEVELOPED THE MEASURE**

The Agency for Healthcare Research and Quality (AHRQ) Quality Indicators are in the public domain and the specifications come from multiple sources, including the published and unpublished literature, users, researchers, and other organizations. AHRQ as an agency is responsible for the content of the indicators.

**FINANCIAL DISCLOSURES/OTHER POTENTIAL CONFLICTS OF INTEREST**

None

**ENDORSER**

National Quality Forum

**INCLUDED IN**

National Healthcare Disparities Report (NHDR)  
National Healthcare Quality Report (NHQR)

**ADAPTATION**

This diagnosis code was proposed by Miller and colleagues (2001) as one component of a broader indicator ("iatrogenic conditions") in the "Patient Safety Indicator Algorithms and Groupings." It was also included as one component of a broader indicator ("adverse events and iatrogenic complications") in the Agency for Healthcare Research and Quality's (AHRQ's) Version 1.3 Healthcare Cost and Utilization Project (HCUP) Quality Indicators.

**RELEASE DATE**

2003 Mar

**REVISION DATE**

2008 Mar

**MEASURE STATUS**

This is the current release of the measure.

This measure updates previous versions:

- AHRQ quality indicators. Guide to patient safety indicators [version 3.0a]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 May 1. 78 p. (AHRQ Pub; no. 03-R203).

- AHRQ quality indicators. Patient safety indicators: technical specifications [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 107 p.

## **SOURCE(S)**

AHRQ quality indicators. Guide to patient safety indicators [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ)AHRQ Pub; 2007 Mar 12. 76 p.(AHRQ Pub; no. 03-R203).

AHRQ quality indicators. Patient safety indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar 10. 107 p.

## **MEASURE AVAILABILITY**

The individual measure, "Iatrogenic Pneumothorax (Provider Level Definition) (PSI 6)," is published in "AHRQ Quality Indicators. Guide to Patient Safety Indicators" and "AHRQ Quality Indicators. Patient Safety Indicators: Technical Specifications." These documents are available in Portable Document Format (PDF) from the [Patient Safety Indicators Download](#) page at the Agency for Healthcare Research and Quality (AHRQ) Quality Indicators Web site.

For more information, please contact the QI Support Team at [support@qualityindicators.ahrq.gov](mailto:support@qualityindicators.ahrq.gov).

## **COMPANION DOCUMENTS**

The following are available:

- AHRQ quality indicators. Patient safety indicators: software documentation [version 3.2] - SAS. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar 10. 42 p. This document is available in Portable Document Format (PDF) from the [Agency for Healthcare Research and Quality \(AHRQ\) Quality Indicators Web site](#).
- AHRQ quality indicators. Software documentation: Windows [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar 10. 99 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- Patient safety indicators: covariates [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 27 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- Patient safety indicators: covariates (with POA) [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 27 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- Remus D, Fraser I. Guidance for using the AHRQ quality indicators for hospital-level public reporting or payment. Rockville (MD): Agency for Healthcare Research and Quality; 2004 Aug. 24 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).

- AHRQ summary statement on comparative hospital public reporting. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Dec. 1 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- Guidance for using the AHRQ quality indicators for public reporting or payment - appendix A: current uses of AHRQ quality indicators and considerations for hospital-level reporting. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Dec. A1-13 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- Guidance for using the AHRQ quality indicators for public reporting or payment - appendix B: public reporting evaluation framework--comparison of recommended evaluation criteria in five existing national frameworks. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2005 Dec. B1-4 p. This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- UCSF-Stanford Evidence-based Practice Center. Davies GM, Geppert J, McClellan M, et al. Refinement of the HCUP quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2001 May. (Technical review; no. 4). This document is available in PDF from the [AHRQ Quality Indicators Web site](#).
- HCUPnet. [internet]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2004 [accessed 2007 May 21]. [Various pagings]. HCUPnet is available from the [AHRQ Web site](#). See the related [QualityTools](#) summary.

## **NQMC STATUS**

This NQMC summary was completed by ECRI on October 1, 2003. The information was verified by the measure developer on October 29, 2003. This summary was updated by ECRI on February 7, 2005 and again on April 11, 2006. The information was verified by the measure developer on July 31, 2006. This NQMC summary was updated by ECRI Institute on June 12, 2007 and again on October 15, 2008.

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